~~TOP SECRET~~ [redacted]

~~TALENT-KEYHOLE Channels~~

CORONA

[redacted]

Technical Data to be Incorporated in TALENT-KEYHOLE System

ACSI, DA
Attn: Tech Br

CofEngrs

2 July 1962

[redacted]

1. Attached are the comments of the Office of Chief of Engineers pertaining to the plan for expanding the TALENT-KEYHOLE control system to incorporate specific technical data presently included as a part of the CORONA control system together with a listing of specific items which are recommended for transfer to the expanded TALENT-KEYHOLE system. It is believed that the proposed transfer of these specific technical data from the highly restrictive security provided for the CORONA system to the TALENT-KEYHOLE control system, which provides a broader operating base, will provide the principal data currently required by this office to properly carry out the Army responsibility for data reduction. Further, this transfer should result in the strengthening of the security of limited highly classified information which requires the absolute maximum security protection afforded by the CORONA and related control systems by permitting a reduction in personnel requiring full knowledge of all aspects of the entire program.

2. As known by your office, the lack of an adequate number of operational clearance has seriously prejudiced the Army's capability to carry out the assigned data reduction mission. Additionally, even possession of these clearances by a restricted number of Engineer personnel has not enabled us to actually acquire, in time, sufficient technical data to adequately plan for and accomplish the data reduction mission.

3. It is recommended that every effort be made to include all of the recommended technical data items in the TALENT-KEYHOLE control system and, at the same time retain a sufficient number of "operational" clearances to assure that the new system will satisfy the Army's need.

FOR THE CHIEF OF ENGINEERS:



[redacted]

Colonel, Corps of Engineers
Assistant Director for Topography, T&ME

1 Incl
Analysis of Engr
Access to Technical
Data

Copy to:
[redacted]

CORONA

HANDLE VIA [redacted] CONTROL SYSTEM ONLY

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TOP SECRET
~~France Via TALENT-KEYHOLE Channels~~
CORONA

# ANALYSIS OF ENGINEER ACCESS TO TECHNICAL DATA

1. Background.

a. The principle of complete separation of ground data reduction and collection aspects of space programs, as interpreted and implemented by the Air Force, has done incalculable damage to the Engineer programs in the mapping and geodetic fields. The Engineers first learned of the TALENT-KEYHOLE program only after receipt of end-products, resulting in the effective loss of several months before exploitation could begin. During the period of July-August 1961 three Engineer personnel (as members of the Interservice Reconnaissance, Mapping and Geodetic Working Group) were privileged to obtain some advanced technical data on a few data acquisition systems. However the strict security requirement imposed by the Department of the Air Force specifically prevented use of this knowledge in either research and development of data reduction equipment or in planning for exploitation of end-products. The first useable technical data on some of the CORONA systems was received in the form of Technical Bulletins in the TALENT-KEYHOLE control system. An analysis of the deficiencies of these Technical Bulletins is as follows:

b. Reference is made to the five following TALENT-KEYHOLE Technical Bulletins thus far released and available to Engineer personnel. Column A is the date of publication; column B is the date Engineer personnel were informed of the system; column C is the date publication was received in BESPA; and Column D is the date that the system end-product material was first received.

| | | | | |
|---|---|---|---|---|
| [redacted] | Dec 61 | 1 Jan 62* | NR | NR |
| | 12 Mar 62 | 15 Apr 62* | 4 May 62 | NR |
| | 30 Jan 62 | 1 Feb 62* | 15 Feb 62 | 13 Mar 62 |
| | Feb 62 | 1 Feb 62 | NR | 13 Mar 62 |
| | Mar 62 | 1 Feb 62 | 23 Mar 62 | 13 Mar 62 |

* Approximate date
NR - never received
[redacted]

2. Informational Deficiencies. An evaluation of these few Technical Bulletins from both an R&D and exploitational standpoint is as follows.

a. Research and Development.

(1) Panoramic Cameras. Except for the 201 System of which the majority of the required data was furnished, information regarding other systems has either been nil or so inadequate that design of necessary data reduction equipment and techniques was impossible.

(2) Frame Cameras from C Systems. The Bulletins failed to provide necessary camera characteristic such as lens distortion, particular to the framing

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cameras, general characteristics of the reseau (image size and distribution over the format area) and image distortion introduced into the optical system by the reseau plate.

b. Exploitational. The same information lack cited above for the R&D affects the exploitational program development.

3. Discussion.

a. General. The late receipt of technical information and schedules on data acquisition systems has made it impossible for the Army to adequately plan, budget for, schedule, and accomplish the necessary research and development of the data reduction equipment and techniques or the necessary staffing to effectively exploit the end products in a timely or adequate manner. It has led to uneconomical, inefficient and wasteful diversion of limited funds and manpower from other approved projects and resulted in back-logging of a number of essential projects. At no time have sufficient funds been available, even if time permitted, to do the job well. The added problems of expediting recruitment and clearances of new personnel have also seriously impeded a logical, orderly progression. Lack of sufficient time to budget for R&D or operational funds and hasty diversion of funds and manpower from other projects has necessitated the use of field expedient equipment and procedures. For example the delayed receipt of KH-4 information will result in at least a one-year delay in the full exploitation of the end-products for mapping purposes. It should be recognized that technical data on initial plans and design characteristics of new data-acquisition systems should be available to the Army in time to permit concurrent budgeting and R&D of the necessary data-reduction equipment and techniques at the same time that the data acquisition system is being developed by the Air Force.

b. Research and Development. The time element is of paramount importance in the design and development of data reduction equipment and procedures. An early delivery of the details of the data acquisition sensors is required to insure timely development of a compatible ground data reduction system. Following are two examples.

(1) The lens distortion data are needed in the planning and development of procedures and equipment to compensate this distortion where required in the data reduction process.

(2) The reseau characteristics are needed in the development of equipment and procedures required to efficiently extract the data.

c. Exploitational Planning. It is necessary that a sufficient number of exploitational Engineer personnel be informed of systems characteristics. They should be divided into two groups -- one an exploitational development group and the other a production supervisory group -- to accomplish the following:

(1) Development Group will require clearance to work with the research and development personnel on new equipment design and modification of present available equipment, and will be responsible for establishing operational techniques and programs, manpower and time requirements and funding based upon equipment and system characteristics.

(2) Supervisory Group will require clearance at a later time, but prior to receipt of the materials, for the purpose of working with the development group on the newly established techniques and programs. This will provide them with sufficient time to organize their production schedules. As has happened in all cases in the past, production has been delayed because techniques and programs have not been able to be established until after receipt of the new material. The first panoramic photography could not be used in mapping production for several months because of lack of techniques and operational personnel and then only partial utilization was possible because of necessity to resort to makeshift techniques.

4. Requirements.

a. During the conceptual phase of any new or modified data acquisition system, a limited number of Army representatives must be included in the planning group so that maximum value for mapping utilization can be realized.

b. During the design phase of any new or modified data acquisition system, continuous coordination should be maintained between data acquisition design group and Army representatives so that data reduction equipment and procedures can be designed based on the most current information in order that maximum mapping utilization can be realized.

c. In the operational planning phase, time schedules and number of payloads planned should be furnished to the Army for use in planning and scheduling development and modification of equipment and procedures. This information together with technical data would enable adequate budget planning for research and development.

d. As final data acquisition system characteristics are determined, the following information should be furnished to the Army for use in development of equipment and procedures and for essential planning for exploitation:

(1) Mission.

(2) Contractors and subcontractors for data acquisition system.

(3) Type of sensor. (frame or panoramic)

(4) Sensor orientation.

(5) Auxiliary data recorded and characteristics of auxiliary cameras (including focal length, distortion, resolution, format size and location of fiducial marks).

(6) Lens distortion and reseau plate where applicable.

(7) Calibration procedures and expected tolerances on measured values.

(8) Calibrated focal length (when available).

(9) Type of lens and nominal lens distortion throughout field.

(10) Nominal focal length.

(11) Format size and location of fiducial marks.

(12) Calibrated reseau (where applicable).

(13) Calibrated fiducial values (when available).

(14) Nominal fiducial values.

(15) Ground coverage per mission

Lateral

Length

(16) Operational altitude.

(17) Vehicle velocity.

(18) Film data

Type

Footage

Width

(19) Scale of photography at nadir.

(20) Image motion compensation

Rates

Direction

(21) Data Chamber.

(22) Rotational control limitations (pitch, roll).

(23) Filters.

(24) Aperture data.

(25) Nominal lens-film resolution throughout field.

(26) Date of expected receipt of material.

(27) Number of frames per mission.

(28) Number of missions per year.

(29) Approximate interval of time between missions.

5. Recommendations.

a. Army representatives be included in data acquisition system planning group during concept and design phases.

b. Operational schedules and number of missions planned be furnished to the Army during initial planning stage and revised as required.

c. Adequate operational clearances be provided to the Army to cover required Army personnel participation in concept and design phase of data acquisition system.

d. Detailed technical characteristics of data acquisition systems as listed in para 4d be furnished to the Army as soon as it is available.

6. Summary.

a. Engineer experience in the past has clearly demonstrated that the principle of complete separation of ground data reduction and collection aspects of the various space and over-flight programs, as implemented, has adversely affected the national effort in the fields of mapping and geodesy. A continuous flow of information and planning knowledge through the interface between these two aspects of the program is vitally essential to insure proper compatability and responsiveness. Assurance is needed that concurrent efforts from the initial planning phase through the introduction of equipments into the operational inventory are realized, so as not to repeat past situations where lack of compatible or adequate ground data reduction equipment and manpower resources did not permit proper processing or reduction of the collected material, or where the collected materials are obtained at a rate or quality far out of proportion to the capabilities available to handle them.

b. The plan to expand the base of the TALENT-KEYHOLE control system to embrace certain technical data presently encompassed in the CORONA and related operation control systems appears to offer an answer to this impasse. It is hoped that this plan can be implemented expeditiously and successfully, as the Army

mission in mapping and geodesy is ever presently being severely handicapped.

c. A successful plan is vital to meeting the Army objectives of economy, better program planning and continuity, future program flexibility and quick reaction time in the data reduction field.